CENPP-PE-HR (1110-2-1150) 30 August 1993
BRITTON/6471/NGUYEN

MEMORANDUM FOR Chief, CENPP-OP-NW, ATTN: Gornick

SUBJECT: Irrigon Boat Basin Sediment Evaluation

1. Enclosed is the sediment evaluation of Irrigon Boat Basin at Irrigon, Oregon. The sediment is sandy, clayey, medium to coarse silt. Contaminants were below established concern levels except for cadmium in one sample (1.13 ppm) and total DDT in all three samples (7-10 ppb). The average total DDT (8.3 ppb) exceeded EPA, Region 10 screening level (6.9 ppb) but not Portland District levels of concern (15-20 ppb). The pesticides dieldrin and endrin were detected (2 ppb) at concentrations that were below established screening levels (10-20 ppb). Small amounts of PAHs were detected (20-41 ppb). Individual and total PAHs were well below screening levels. No PCBs or phenols were detected. Based on the above physical and chemical results and 404 (b)(1) guidelines of the Clean Water Act, the sediment from Irrigon Boat Basin is acceptable for in-water or upland disposal with no unacceptable adverse environmental impacts expected.

2. If you have any questions regarding this sediment evaluation, please contact Jim Britton, at extension 6471.

Encl

WILLIAM E. BRANCH, P.E.
Chief, Hydraulics and Hydrology Branch

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Irrigon Boat Basin Sediment Evaluation

Abstract

The sediment from Irrigon Boat Basin is sandy, clayey, medium to coarse silt. Contaminants were below established concern levels except for cadmium in one sample (1.13 ppm) and total DDT in all three samples (7-10 ppb). The average total DDT (8.3 ppb) exceeded EPA, Region 10 screening level (6.9 ppb) but not Portland District levels of concern (15-20 ppb). The pesticides dieldrin and endrin were detected (2 ppb) at concentrations that were below established screening levels (10-20 ppb). Small amounts of PAHs were detected (20-41 ppb). Individual and total PAHs were well below screening levels. No PCBs or phenols were detected. Based on the above physical and chemical results and 404 (b)(1) guidelines of the Clean Water Act, the sediment from Irrigon Boat Basin is acceptable for in-water or upland disposal with no unacceptable adverse environmental impacts expected.

Introduction

1. Irrigon Boat basin is located in Irrigon, Oregon at Columbia River River Mile 282. The boat basin is about 292 feet wide by 350 feet long. It is used primarily by locals for launching of boats for recreational purposes. The depth of the boat basin is maintained at -4 Minimum Pool Elevation (MPE). Currently parts of the basin are above -4 MPE so that about 5,500 cubic yards of sediment needs to be dredged. Chemical characterization of the sediment has not been performed in the past. To adequately assess dredging disposal options and to satisfy requirements of section 401 of the Clean Water Act (CWA), sediment was sampled and tested for grain size distribution and chemical contaminants.

Methods

2. Sediment samples were taken at the sites shown on the enclosed map (Figure 1) on 4 June 1993. A gravity corer sampling device was used so that the dredging prism was sampled. A subsample of the entire core length was composited for physical and chemical analyses. Grain size distribution, resuspended density, void ratio, particle roundness grading and volatile solids content were measured by the USACE, Portland District, Materials Lab, Troutdale, Oregon. Total organic carbon (TOC), metals, pesticides, polychlorinated biphenyls (PCBs), acid soluble sulfide (AVS), polynuclear aromatic hydrocarbons (PAHs) and phenols were measured by Columbia Analytical Associates, Kelso, Washington using EPA/USACE approved methods (1). All sampling, handling, storage and shipping of samples was conducted according to EPA/USACE approved guidelines (1). A quality assurance (QA) report regarding the chemical analyses was prepared by chemists from the Materials Laboratory, U. S. Army Corps of Engineers, Troutdale, Oregon. That QA report and the raw data are enclosed.

Results/Discussion

3. Median grain sizes ranged from medium to coarse silt (0.016-0.040 mm). Sample IR-GC-3 showed a fairly even distribution between sand, silt and clay - 31.2, 57.8 and 11.0 percent respectively compared to other samples. Probing the bottom and comments from locals indicated that some rocks, probably from rip-rap used to stablize sides of the jetty, were scattered accross the bottom.

4. Concentrations of metals are shown in Table 2. Mean metals concentrations were below established Portland District guidelines and EPA, Region 10 screening levels. Sample IR-GC-2 exceeded the screening level (SL) for cadmium (1.13 ppm vs 0.96 ppm SL). The zinc level in this sample was also the highest of the three samples. Cadmium and zinc are often associated with each other in rock and sediment samples. The levels found are comparative to those commonly found in other boat basins along the Columbia River between Irrigon and the mouth which appear to be enriched in cadmium and zinc (2-5).

5. The mean AVS concentration (1.29 um/g) is low in comparison to those from other boat basins in the Columbia River. For instance, the mean concentration in Chinook Marina was 51 um/g and in Ilwaco Boat Basin 33 um/g. According to the enclosed quality assurance report the AVS concentration is probably a low estimate. Matrix spike and laboratory control samples showed low recoveries that did not meet CAS QC criteria. Reanalysis yielded better recoveries but they were still below acceptance critria. The actual AVS concentrations are probably higher than reported. AVS is useful because its presence may serve to render metals less toxic to aquatic organisms by forming insoluble metal sufides. Knowledge of AVS concentration is less important in this case because metals concentrations in the basin are low relative to most concern levels.

6. Pesticide and PCB concentrations are shown in Table 3. PCBs were undetected with a detection limit of 10 ppb. Five of nineteen pesticides were detected at low concentrations in the samples. All samples contained DDT and DDE a breakdown product of DDT. Sample IR-GC-1 contained DDE (2 ppb), DDT (6 ppb), and Endrin (2 ppb). Sample IR-GC-2 contained DDD (2 ppb), DDE (4 ppb) and DDT(4 ppb). Sample IR-GC-3 contained DDE (4 ppb), DDT (3 ppb) and Dieldrin (2 ppb). Total DDT (tDDT), defined as the sum of DDD, DDE and DDT concentrations, ranged from 7 to 10 ppb in the samples. The finding of DDT and its breakdown products in the samples is not suprising because DDT, despite being banned since the year 1972, is still widely distributed in the environment (6). DDT is persistent because it is "chemically stable and is not broken down by microorganisms, heat, or ultraviolet light" (6). DDT is carried downstream from agricultural areas in runoff containing soil particles, primarily in the suspended solids fraction that contains organic matter. DDT is not very soluble in water. So, as suspended soil particles settle out, the sediment becomes enriched in DDT, DDD and DDE. For example, in the late 1980's in the lower Yakima River along agricultural areas where DDT was used, DDT in sediment was found to be as high as 2,100 ppb - roughly 350 times greater than found in Irrigon Boat Basin (6).

7. PAH concentrations are shown in Table 4. Five out of seventeen PAHs were detected. These were fluorene, phenanthrene, fluoranthene, pyrene and chrysene. Their concentrations varied between 20 and 41 ppb. None were above EPA, Region 10 screening levels or Portland District levels of concern (see Table 4). Sources of PAHs to the boat basin are few. Besides background input from the atmosphere and upstream water, possible local sources are runoff from the parking lot and vehicular emissions and hydrocarbon leaks from recreational boats using the basin.

8. Phenols were undetected in samples with detection limits at 20 ppb for all except pentachlorophenol which was 50 ppb. There are no known sources of phenols in the area.

Conclusions

9. The sediment from Irrigon Boat Basin is sandy, clayey, medium to coarse silt. Metals contaminants were below established concern levels except for cadmium in one sample (1.13 ppm). Columbia River sediments appear naturally enriched in cadmium. Total DDT in all three samples (7-10 ppb) and the average tDDT (8.3 ppb) exceeded the EPA, Region 10 screening level (6.9 ppb) but not Portland District levels of concern (15-20 ppb). The pesticides dieldrin and endrin were detected (2 ppb). The concentrations were well below established screening levels (10-20 ppb). Small amounts of PAHs were detected (20-41 ppb). Individual and total PAHs were well below screening levels. No PCBs or phenols were detected.

10. Based on the above physical and chemical results and 404 (b)(1) guidelines of the Clean Water Act, the sediment from Irrigon Boat Basin is considered acceptable for in-water or upland disposal with no unacceptable adverse environmental impacts expected. Only about 5,500 cubic yards of sediment are to be dredged. If disposed at the proposed dispersive in-water site, located about 300 feet offshore from the boat basin, the material will be rapidly dispersed downstream and will not accumulate at the site. There will be a temporay turbidity plume that may be aesthetically displeasing as material is diluted and dispersed.

REFERENCES

1. U. S. Environmental Protection Agency and U. S. Army Corps of Engineers. February 1991. Evaluation of Dredged Material Proposed for Ocean Disposal (Testing Manual).

2. Britton J. U. S. Army Corps of Engineers, Portland District. 20 July 1992. Evaluation of Sediment at U. S. Coast Guard Station Ilwaco, Washington.

3. Britton J. L., Siipola M. and Malek J. December 1992. Characteristics of Chinook Marina sediment in Baker Bay, Washington. Prepared by the U. S. Army Corps of Engineers, Portland District for EPA, Region 10, Seattle, Washington.

4. Britton J. L., Siipola M. and Malek J. December 1992. Characteristics of Ilwaco Boat Basin sediment in Baker Bay, Washington. Prepared by the U. S. Army Corps of Engineers, Portland District for EPA, Region 10, Seattle, Washington.

5. Britton J. U. S. Army Corps of Engineers, Portland District. 21 August 1991. Skipanon River Sediment Evaluation.

6. Rinella J. F., Hamilton P. A., McKensie S. W., and Rubin J. M. U. S. Geological Survey Circular 1090. Persistence of the DDT pesticide in the Yakima River Basin Washington.

Table 1. Results of physical analyses of Irrigon Boat Basin sediment.

sample	med. gr. size	sand	silt	clay	volatile solids
	mm		%		
IR-GC-1	0.028	5.8	84.2	6.1	2.3
IR-GC-2	0.016	8.4	75.1	15.5	3.1
IR-GC-3	0.040	31.2	57.8	11.0	1.9
mean	0.027	15.1	72.4	10.9	2.4

Table 2. Bulk metals, AVS and TOC in Irrigon Boat Basin sediment.

sample	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn	AVS
					(ppm)				um/g
IR-GC-1	3	0.79	12.4	18.7	12	0.05	10.7	97	0.18
IR-GC-2	6	1.13	15.7	25.5	17	0.06	13.4	145	2.05
IR-GC-3	6	0.90	17.1	28.5	17	0.06	17.6	133	1.64
mean	5	0.94	15.1	24.2	15	0.06	13.9	125	1.29
SL*	57	0.96	180	81	66	0.21	140	160	

* SL=EPA, Region 10 screening level

Table 3. Pesticides* and PCBs in bulk sediment from Irrigon Boat basin.

sample	DDD	DDE	DDT	Dieldrin	Endrin	PCBs
				ppb		
IR-GC-1	<2	2	6	<2	2	<10
IR-GC-2	2	4	4	<2	<2	<10
IR-GC-3	<2	4	3	2	<2	<10

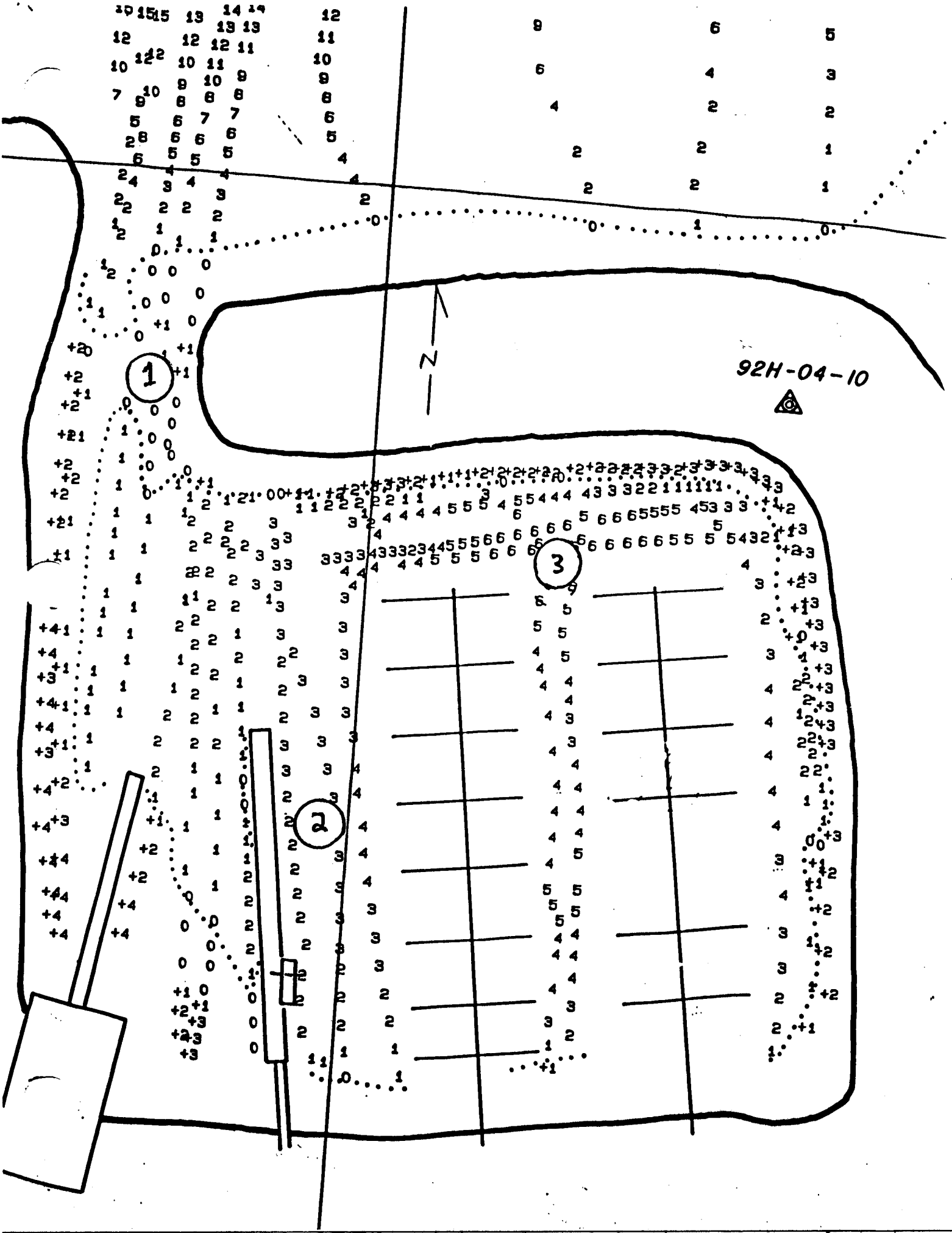
* Analyses were conducted to test for 19 pesticides and 7 PCB aroclors. Only those pesticides detected are shown. Detection limits were generally 2 ppb for pesticides and 10 ppb for PCBs. Less thans are detection limits.

Table 4. PAHs* detected in bulk sediment from Irrigon Boat Basin.

sample	fluorene	phenanthrene	fluoranthene	pyrene	chrysene
			ppb		
IR-GC-1	22	41	41	36	34
IR-GC-2	<20	20	<20	<20	<20
IR-GC-3	<20	23	23	<20	20
SL	64	320	630	430	620

* Analyses were conducted for 17 PAHs, only those detected are shown. Detection limit was 20 ppb for all PAHs.

Figure 1. Irrigon Boat Basin Sample Stations



19 July 1993

John Malek
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Seattle, WA 98101

John:

1. Enclosed are copies of the final reports covering the characteristics of sediments from three small boat basins - Ilwaco Boat Basin and Chinook Marina, both in Baker Bay, Washington, and Gold Beach Boat Basin located at the mouth of the Rogue River. The studies leading to these reports were conducted at your request with funding from the EPA.

2. The purpose of the studies was to collect background information regarding sediment characteristics in the basins. Many smaller boat basins are outside of Federally authorized dredging channels and are infrequently studied. In recent years the Corps of Engineers, Portland District, and EPA, Region 10, have been cooperatively and routinely evaluating selected locations and sediment quality parameters. This has allowed for efficient use of Federal monies while providing quality, scientific information useful to both agencies. Characteristics such as grain size distribution and levels of contaminants, if any, in small boat basin sediments are used to provide a basis for decision making regarding disposal of sediments from maintenance dredging. The information also provides a 'snap shot' of the environmental conditions in the boat basins.

3. Portland District, U. S. Army Corps of Engineers is pleased to perform these studies for the EPA and looks forward to further opportunities to assist in collecting valuable background information on sediments outside of Federal Channels.

4. If you have any questions regarding these reports please contact Jim Britton, CENPP-PE-HR, at (503)326-6471.

Encl
as

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Chief, Planning and Engineering
Division